Unit 3
Day 1
Section 2.3
Pure Imaginary Numbers and the Powers of i

Give answers to packet complex number pages.

PURE IMAGINARY NUMBERS

The square of the imaginary unit, which we denote by i , is -1 .

$$i^2 = -1$$

$\sqrt{-1} = i$

POWERS OF i

$$i^1 = i$$

POWERS OF i

$$i^1 = i$$

$$i^2 = -1$$

POWERS OF i

$$i^1 = i$$

$$i^2 = -1$$

$$i^3 = i^2 \cdot i = -1 \cdot i = -i$$

POWERS OF i

$$i^1 = i$$

$$i^2 = -1$$

$$i^3 = i^2 \cdot i = -1 \cdot i = -i$$

$$i^4 = i^2 \cdot i^2 = -1 \cdot -1 = 1$$

POWERS OF i

$$i^1 = i$$

$$i^2 = -1$$

$$i^3 = i^2 \cdot i = -1 \cdot i = -i$$

$$i^4 = i^2 \cdot i^2 = -1 \cdot -1 = 1$$

$$i^5 = i^4 \cdot i = 1 \cdot i = i$$

POWERS OF i

$$i^1 = i$$

$$i^2 = -1$$

$$i^3 = i^2 \cdot i = -1 \cdot i = -i$$

$$i^4 = i^2 \cdot i^2 = -1 \cdot -1 = 1$$

$$i^5 = i^4 \cdot i = 1 \cdot i = i$$

$$i^6 = i^4 \cdot i^2 = 1 \cdot -1 = -1$$

POWERS OF i

$$i^1 = i$$

$$i^2 = -1$$

$$i^3 = i^2 \cdot i = -1 \cdot i = -i$$

$$i^4 = i^2 \cdot i^2 = -1 \cdot -1 = 1$$

$$i^5 = i^4 \cdot i = 1 \cdot i = i$$

$$i^6 = i^4 \cdot i^2 = 1 \cdot -1 = -1$$

$$i^7 = i^4 \cdot i^3 = 1 \cdot -i = -i$$

POWERS OF i

$$i^1 = i$$

$$i^2 = -1$$

$$i^3 = i^2 \cdot i = -1 \cdot i = -i$$

$$i^4 = i^2 \cdot i^2 = -1 \cdot -1 = 1$$

$$i^5 = i^4 \cdot i = 1 \cdot i = i$$

$$i^6 = i^4 \cdot i^2 = 1 \cdot -1 = -1$$

$$i^7 = i^4 \cdot i^3 = 1 \cdot -i = -i$$

$$i^8 = i^4 \cdot i^4 = 1 \cdot 1 = 1$$

No need to write this slide in your notes!

POWERS OF i

$$i^1 = i \qquad i^5 = i \qquad i^9 = i$$

$$i^2 = -1 \qquad i^6 = -1 \qquad i^{10} = -1$$

$$i^3 = -i \qquad i^7 = -i \qquad i^{11} = -i$$

$$i^4 = 1 \qquad i^8 = 1 \qquad i^{12} = 1$$

1. $i^{2049} = i^{1} = i$

$4 \overline{)2049}$

2. $i^{3873943} = i^{3} = -i$

3. $i^{-17} = \frac{1}{i^{17}} = \frac{1}{i} \cdot \frac{i}{i} = \frac{i}{-1} = -i$

4. $-i^{51} = -(i^{3}) = -(-i) = i$

Definition of Equality- for real numbers a,b,c and d,
a+bi=c+di iff (if and only if) a=c and b=d.

1. Find the real values of a and b.

$$a - 10i = 7 + 12bi + 8a$$

$-8a \qquad -8a$

$-7a - 10i = 7 + 12bi$

$-7a = 7 \qquad -10 = 12b$

$a = -1 \qquad b = \frac{-10}{12} = -\frac{5}{6}$

2. Find the real values of a and b.

$$8i - 2(a-5) = 2 + 2i(b+4)$$

HW pg 109 39-50 all